AMENDMENTS TO THE SPECIFICATION

Page 1, please delete the paragraph beginning at line 1 and substitute therefor the following paragraph:

BACKGROUND OF THE INVENTION

~~TECHNICAL~~ FIELD OF THE INVENTION

The present invention is directed to a wireless sensor device, and more particularly to such a wireless device including a power generating element that converts an external energy into an electric power for transmitting a sensed result as a radio signal.

Pages 1 and 2, please delete the paragraph beginning at line 6 and substitute therefor the following paragraph:

~~BACKGROUND~~ DESCRIPTION OF THE RELATED ART

Japanese Patent Publication No. 2004-24551 discloses a self-contained sensing system including a power generating means for transmitting a sensed result. The system includes a sensor for sensing a temperature, an acceleration, or infrared ray to ~~give~~ provide a sensor signal indicative of a sensed analog value, and an A/D converter which converts the sensor signal into digital data. The digital data are processed by a microprocessor so as to be transmitted through a radio transmitter as a radio signal. A solar cell is included as the power generating means in order to supply an operating power to the A/D converter, the microprocessor, and the radio transmitter. Because of that the solar cell is not expected to constantly generate sufficient power to keep the system operative, the system requires a power regulator which enables ~~the~~ operation only while much power is being generated at the solar cell in order to transmit a reliable sensor result. Also because of that the radio transmitter along with the A/D converter consumes relatively large electric power, the system suggests the use of a wireless transmission technology generally known as UWB (Ultra Wide Band) transmission which operates at a low power. However, there is still a need of minimizing the operating power in the wireless sensor system, particularly in case that the A/D converter is not necessary and only one-bit information is sufficient as the

sensor result, in order to keep a reliable sensing operation over an extended period of time while relying upon the power generator of limited power generating capacity.

Pages 2 and 3, please delete the paragraph beginning at line 7 and substitute therefor the following paragraph:

~~DISCLOSURE~~ SUMMARY OF THE INVENTION

In view of the above problem, the present invention has been accomplished to provide a wireless sensor device which is less power consuming and is capable of operating over a prolonged period of time for providing a reliable sensor result. The wireless sensor device includes a sensor configured to sense a target object and provide a sensor signal of varying levels indicative of condition of the target object, a signal processing circuit configured to amplify the sensor signal and ~~give~~ provide an amplified electric analog signal, and a detection circuit configured to receive the amplified analog signal and provide a detection output (Dout) when the electric analog signal goes beyond a predetermined detection threshold. Also included in the device is a radio transmitter which is configured to transmit a radio detection signal (RS) in response to the detection output. Further, the device includes a power supply configured to provide an electric power to the signal processing circuit and the radio transmitter; and a power generating element which converts an external energy into the electric power to be accumulated in the power supply. ~~The essential feature of the present invention resides in that a~~ A controller is included to activate the radio transmitter only in response to the detection output, permitting the radio transmitter to generate the radio detection signal. Accordingly, the radio transmitter can be kept inactivated until receiving the detection output, thereby saving energy to prolong the operating life of the power supply and, i.e., the device.

Pages 3 and 4, please delete the paragraph beginning at line 21 and substitute therefor the following paragraph:

In order to further save the energy on the side of the signal processing circuit, the controller may be configured to give a sleep mode of operating the signal processing circuit at a reduced power, and to shift the sleep mode to a normal mode for

reliable detection once there is acknowledged a slight sign leading to the detection output. In the normal mode, the signal processing circuit operates at a rated power to obtain the electric signal (Vout) of rated amplitude proportional to the rated power. In the sleep mode, the signal processing circuit operates at ~~the~~ a reduced power to obtain the electric signal (Vout) of low amplitude proportional to the reduced electric power. In this connection, the detection circuit is configured to have a wake-up threshold which is lower~~, i.e., stricter~~ than the detection threshold. The controller is designed to switch the normal mode to the sleep mode when the electric signal (Vout) of rated amplitude becomes lower than the detection threshold, and to keep the sleep mode until the electric signal of the low amplitude goes beyond the wake-up threshold. The detection output (Dout) is given when the electric signal (Vout) of rated amplitude goes beyond the detection threshold in the normal mode.

Pages 4 and 5, please delete the paragraph beginning at line 13 and substitute therefor the following paragraph:

The sensor may be an infrared ray sensor for detection of a motion of the target object by monitoring a critical change of infrared ray emitted from the target object, for example, human body. The infrared ray sensor is configured to provide the sensor signal which varies in positive or negative directions in response to the motion of the target. In this instance, the detection circuit is configured to have a threshold selector which provides a detection range (A1-A2) defined by upper positive and lower negative ones of said detection threshold, and also a wake-up range (B1-B2) defined by upper positive and lower negative ones of the wake-up threshold. The detection circuit includes a comparator unit which receives the detection range and the wake-up range selectively from the threshold generator for comparison of the analog signal with the selected one of the ranges. The comparator unit generates a first signal either when the electric signal (Vout) of rated amplitude goes beyond the detection range or when the electric signal (Vout) of low amplitude goes beyond said wake-up range, and otherwise generating a second signal. The controller is configured to select the detection range in response to the first signal, and select the wake-up range in response to the second signal. The detection circuit provides the detection output only

upon seeing the first signal in the normal mode. Accordingly, the sensor device can successfully detect the motion of the target object using the infrared ray sensor, while saving ~~the~~ energy.

Page 6, please delete the paragraph beginning at line 12 and substitute therefor the following paragraph:

~~BEST MODE FOR CARRYING OUT THE INVENTION~~
DETAILED DESCRIPTION OF AN EXEMPLARY EMBODIMENT

Referring now to FIG. 1, there is shown a sensor device in accordance with ~~a preferred~~ an exemplary embodiment of the present invention. The device is specifically arranged to detect [[a]] human motion, i.e. whether the human comes into or out of a surveillance area by use of an infrared ray sensor which generates an electric sensor signal responsive to infrared radiation from the human, although the present invention should not be limited to this particular instance. The infrared ray sensor **10** generates the sensor signal which varies in positive and negative directions in response to the motion of the human coming into and out of the surveillance area.

Pages 6 and 7, please delete the paragraph beginning at line 22 and substitute therefor the following paragraph:

The device includes a signal processing circuit **20** which processes the sensor signal to ~~give~~ provide an amplified analog signal, and a detection circuit **50** which compares the analog signal with predetermined criteria to provide a detection output according to the comparison result. The device further includes a radio transmitter **90** which, in response to the detection output (Dout), generates and radiates a radio detection signal (RS) thorough an antenna **97** such that a receiver (not shown) ~~acknowledge~~ acknowledges the detection result. A power supply **100** is included in the device to provide ~~an~~ electric power to the signal processing circuit **20**, the detection circuit **50**, and the radio transmitter **90**. Also included in the device is a power generating element **110** which converts ~~an~~ external energy into the electric power to be accumulated in the power supply **100**. The power generating element **110** is realized in this embodiment by a solar cell which converts the light into the electric power. A

controller **120** is provided to ~~give~~ provide a consistent detection result to the radio transmitter **90** as well as to save the energy in the absence of a critical condition sensed by the sensor, the details of which will be discussed later.

Pages 9 and 10, please delete the paragraph beginning at line 7 and substitute therefor the following paragraph:

The AND-gate **73** is connected through a switch **76** to an output provider **80** which responds to generate the detection output (Dout). The switch **76** is controlled by the controller **120** to close only in response to the first signal, i.e., only when the signal (Vout) goes beyond the detection range (VA1 to VA2) in the normal mode. Otherwise, the switch **76** is kept open such that the output provider **80** ~~gives~~ provides no detection output. The output provider **80** includes a transistor **81** having a drain connected to a reference voltage source Vdd, and a source connected to an output terminal of the detector unit **50**. A gate of the transistor **81** defines an input of the output provider **80** which is connected to receive the output from the comparator unit **70** through the switch **76**. A pull-up resistor **82** is connected across the gate-drain path of the transistor **81** so that the transistor **81** generates the detection output (Dout) upon receiving the first signal (Vout), i.e., the H-level output from the AND-gate **73**. In the absence of the first signal (Vout) fed to the gate of the transistor **81**, it refrains from generating the detection output (Dout). The switch **76** is inserted between the AND-gate **73** and the gate of the transistor **81** in order to avoid a possibility that transistor **81** generates the detection output in the absence of the first signal. Also the switch **76** is controlled by the controller **120** to open only for a short time immediately after the controller **120** shifts the sleep mode to the normal mode and vice versa, thereby preventing the generation of the detection output (Dout) when the signal of reduced amplitude goes beyond the wake-up range in the sleep mode, and like erroneous generation of the detection output which might otherwise occur due to an abrupt voltage change possibly seen in the circuit during the transition between the two modes. Further, the output provider **80** may be configured to include a noise filter which cancels the first signal generated in the wakeup mode or the like noises even when they pass through the switch **76**.

Page 11, please delete the paragraph beginning at line 12 and substitute therefor the following paragraph:

The pulse generator **92** is configured to constitute a ultra wide band transmission (UWB) system, a wireless communication technology that does not use a carrier wave, but rather a train of very short pulses in the order of hundreds of picosecond range. The system therefore requires only a small electric power at the instant of transmitting the data. In the present embodiment, the data is basically composed of a one-bit signal identifying whether or not the detection output (Dout) is H-level, requiring only a very short transmission time. For example, when the radio transmitter **90** transmits the radio detection signal (RS) per ten seconds, each transmission is completed within one millisecond at an average operating current of 2 mA, consuming only 0.2 □A. In this manner, the radio transmitter **90** of the UWB system can operate in a low energy consumption mode, and therefore reducing the power requirement of the sensor system.